We claim:

1. A polarization mode dispersion (PMD) compensator for compensation of PMD in polarization bit interleaved (PBI) optical signals comprising two interleaved bit streams, the compensator comprising:

a polarization controller;

a birefringent element;

a converter for converting an optical output to an electrical signal; and

an analyser for analysing at least one selected spectral component of the electrical signal, wherein the orientation of a signal entering the birefringent element is controlled by the polarization controller in dependence on the electrical signal power of the at least one spectral component, having a frequency corresponding to the bit frequency of the two bit streams which form the bit interleaved signal.

2. A compensator as claimed in claim 1, wherein the orientation of the signal entering the birefringent element is controlled so as to minimize the power of the at least one spectral component.

3. A compensator as claimed in claim 1, wherein the analyser comprises a filter for extracting the at least one selected spectral component of the electrical signal.

4. A compensator as claimed in claim 1, wherein the at least one spectral component comprises at least first and second spectral components, the first having a frequency corresponding to the bit frequency of the two bit streams which form the bit interleaved signal and the

second having a frequency not equal to an integer multiple of the bit frequency of the two bit streams which form the bit interleaved signal.

5. A compensator as claimed in claim 4, wherein the orientation of the signal entering the birefringent element is controlled so as to maximize the ratio of the powers of the second and first spectral components.

6. A compensator as claimed in claim 4, wherein the orientation of the signal entering the birefringent element is controlled so as to maximize the difference between the second and first spectral components.

7. A compensator as claimed in claim 4, wherein the second spectral component has a frequency of approximately half the bit frequency of the two bit streams which form the bit interleaved signal.

8. A compensator as claimed in claim 1, wherein the bit frequency of the two bit streams which form the bit interleaved signal is 20GHz.

9. A polarization mode dispersion (PMD) compensator for compensation of PMD in polarization bit interleaved (PBI) optical signals comprising two interleaved bit streams, the compensator comprising:

a polarization controller;

a birefringent element;

a converter for converting an optical output to an electrical signal; and

an analyser for analysing at least two selected spectral components of the electrical signal, wherein the orientation of a signal entering the birefringent element

is controlled by the polarization controller in dependence on the electrical signal powers of the at least two spectral components, a first spectral component having a frequency corresponding to the bit frequency of the two bit streams which form the bit interleaved signal, and a second spectral component having a frequency not equal to an integer multiple of the bit frequency of the two bit streams which form the bit interleaved signal.

10. A compensator as claimed in claim 9, wherein the control of the orientation minimises the power of the first spectral component and maximises the power of the second spectral component.

11. A method of providing PMD compensation for compensation of PMD in polarization bit interleaved optical signals comprising two interleaved bit streams, the method comprising:

passing the signal through a birefringent element, and controlling the polarization at an input to the birefringent element;

converting the optical output from the birefringent element to an electrical signal;

measuring the electrical signal power at a first frequency corresponding to the bit frequency of each of the two bit streams which form the bit interleaved signal; and

using the measured electrical signal power as a control parameter for controlling the polarization at the input to the birefringent element.

12. A method as claimed in claim 11, wherein polarization is controlled so as to minimize the signal power.

13. A method as claimed in claim 11, further comprising measuring the electrical signal power at a second frequency not equal to an integer multiple of the bit frequency of the two bit streams which form the bit interleaved signal.

14. A method as claimed in claim 13, wherein the polarization is controlled so as to maximize the ratio of the powers at the second and first frequencies.

15. A method as claimed in claim 13, wherein the polarization is controlled so as to maximize the difference between the powers at the second and first frequencies.

16. A method as claimed in claim 13, wherein the second frequency is approximately half the bit frequency of the two bit streams which form the bit interleaved signal.

17. A method of providing PMD compensation for compensation of PMD in polarization bit interleaved optical signals comprising two interleaved bit streams, the method comprising:

passing the signal through a birefringent element, and controlling the polarization at an input to the birefringent element;

converting the optical output from the birefringent element to an electrical signal;

measuring the electrical signal powers at a first frequency corresponding to the bit frequency of each of the two bit streams which form the bit interleaved signal and at a second frequency not equal to an integer multiple of the bit frequency of the two bit streams which form the bit interleaved signal; and

using the measured electrical signal powers as a control parameter for controlling the polarization at the input to the birefringent element.

18. A method as claimed in claim 17, wherein the control minimises the power at the first frequency and maximises the power of the second frequency.

19. An apparatus for estimating PMD in an optical component through which a polarization bit interleaved optical signal has propagated, the apparatus comprising:

a converter for converting an optical output from the component to an electrical signal; and

an analyser for analysing at least selected spectral components of the electrical signal, the PMD in the optical component being derived from the electrical signal power at a frequency corresponding to the bit frequency of the bit interleaved signal and from the dc signal power.

20. An apparatus as claimed in claim 19, wherein the bit frequency of the bit interleaved signal is 40GHz.

21. An apparatus as claimed in claim 19, wherein the analyser comprises a filter arrangement for extracting the spectral components of the electrical signal.

22. A method for estimating PMD in an optical component through which a polarization bit interleaved optical signal has propagated, the method comprising:

converting the optical output to an electrical signal;

measuring the electrical dc signal power and the electrical signal power at a frequency corresponding to the bit frequency of the bit interleaved signal; and

deriving the level of PMD from the two electrical signal powers.

23. A method as claimed in claim 22, wherein the level of PMD is derived from the ratio of the two electrical signal powers.